

The Knowledge Bank at The Ohio State University
Ohio State Engineer

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THERE was a touch of black magic in the making of bronze bushing bearings when William Bunting poured his first moulds 62 years ago.

He carried the formulas for his alloys in his head and in a little memorandum book which was never out of his possession. He gained his knowledge through

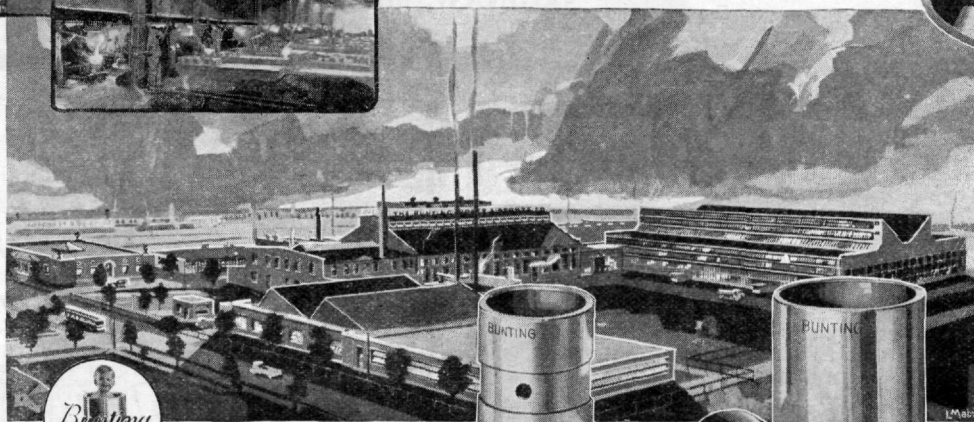
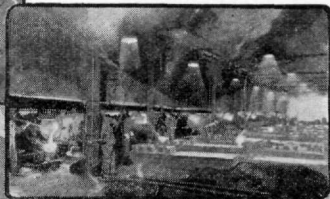
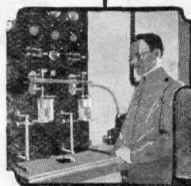
years of patient endeavor, success and failures.

Today his three sons and their sons manufacture Bunting Bushing Bearings in a great plant that gives scientific precision to the unique and exclusive methods originated by three generations of one family working constantly at one specific task.

The Bunting Brass & Bronze Co.

Toledo Ohio

Sixty-two years of progress are built into every one of Bunting Bushing Bearings going into mechanical industry today. The records, statistics, observations, tests and experiences of over a half century are reflected in the operation of a plant that admittedly stands alone in the quality of its product, the scope of its service, and the efficiency of its methods.



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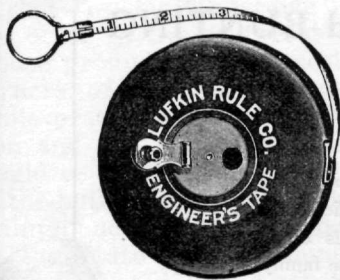
Our competent engineers are always ready to consult and advise you on any of your heating and plumbing problems.

And whether the undertaking is large or small, you may be sure that you will receive the same prompt and courteous attention.

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Popular with the engineers. A $\frac{1}{4}$ " wide extra heavy steel tape in substantial metal-lined leather case. Also furnished in open disc reel and open metal frame.

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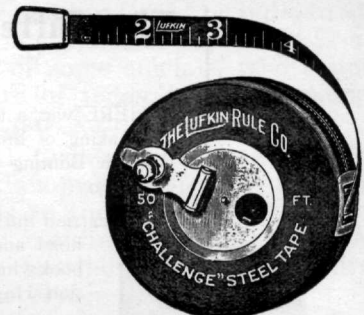
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Units produced by The Hadfield—Penfield Steel Co., of Bucyrus, O., are so built and include—

Diesel Engines

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Manganese Steel—"ERA" Brand

DIESEL ENGINES—Product as much power on one car of oil as can be developed from ten cars of coal under boilers. No shoveling of coal or ashes. One-tenth freight. Cost starts when work starts.

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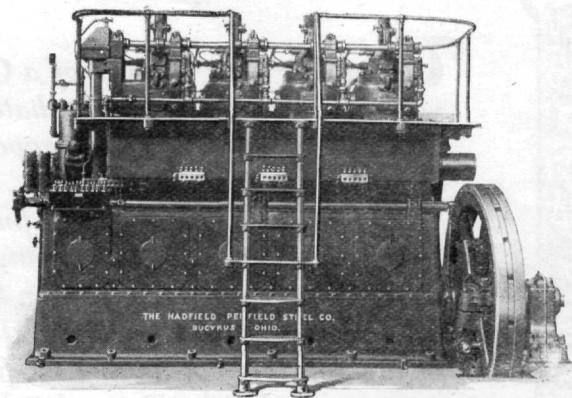
ONE MAN GRADER—Attaches to a Fordson in an hour. One man cuts grading cost to one-fourth. Grades, scrapes, ditches, removes snow.

CRAWLER TRACKS—Make a Crawler of any Fordson. Doubles its pulling power. Goes anywhere. Ford service and low upkeep.

MANGANESE STEEL—For repair parts "ERA" brand has no equal. Extra life without extra cost.

We have other activities and invite correspondence.

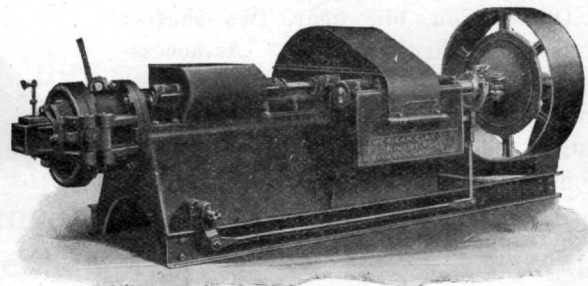
The Hadfield-Penfield Steel Co.
BUCYRUS, OHIO



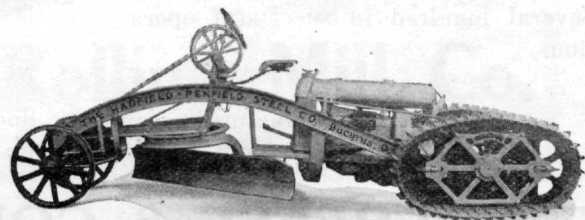
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No. 290 Auger Brick Machine



One Man Grader and Crawler Tracks for Fordson
Can be used Separately or Together



Whatever your "Choice of a Career," college training has increased your economic value, and whatever business or profession you enter, adequate life insurance is a proper self-appraisal of your powers in that direction.

The traditions, practices, and financial strength of the JOHN HANCOCK Mutual Life Insurance Company are such that a college man can take especial pride in having a John Hancock policy on his life. It is also a distinct asset from the start. It will pay you to buy it; and later on, should you think of joining the field corps of this company, it will also pay you to sell John Hancock policies. Our representatives will tell you just how, and assist you in selecting both your career and your insurance.

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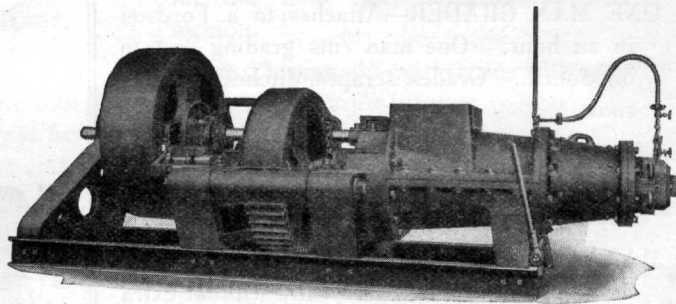
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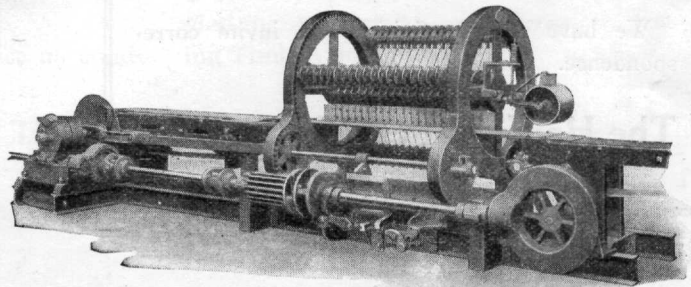
Auger Brick Machine

One pinion, one gear, two shafts; detachable thrust bearing. As accessible as a brick machine can be built. We also build the Union Machine—an auger machine and a pug mill in one construction.



Rotating Automatic Cutter

Producing the highest grade face brick, without repressing. Equally satisfactory for commons and pavers. Several hundred in successful operation.



We manufacture a complete line of auger machinery, having given our attention exclusively to this one class of machinery for over forty years.

E. M. FREESE & COMPANY, Galion, Ohio
DEPENDABLE MACHINERY OF PROVEN EFFICIENCY



Good Friends from now on

THERE'S good news at the plant. The production engineer and the chief inspector have buried the hatchet—their feud is ended—and all because of Ground-Form Cutters.

For months Jones, the engineer, thought that big Mac, the chief inspector, was rejecting gears in order to give production a black eye.

"They're good gears, Mac," protested Jones. "What's the matter with them?"

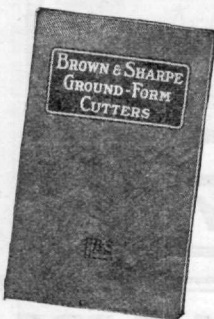
"Sure they're good, if you take them one by one," replied Mac, "but in big lots they're not uniform enough to pass inspection."

And so the war began; Mac grew more careful, and Jones felt sure that Mac had a personal grudge against him.

Then Jones discovered Brown & Sharpe Ground-Form Gear Cutters. He heard that they would increase production and at the same time improve the quality of his gears. He tried a few. Now, all his gear cutting machines are equipped with Ground-Form Gear Cutters.

Mac and Jones are good friends now. Gears come through faster than ever and rejections are few and far between.

Here is the booklet that proved so valuable to Jones. You can avoid his difficulties by getting acquainted with Ground-Form Cutters before the full responsibility of production falls on your shoulders. Write today for your copy of this instructive booklet.



BROWN & SHARPE MFG. CO.
Providence, R.I., U.S.A.

Manufacturers of
Milling — Grinding — Gear Cutting — Screw Machines
Cutters and Hobs — Machinists' Tools

BETTER LIGHTING NEEDED IN INDUSTRIAL PLANTS.

In a paper read before the Illuminating Engineering Society, February, 1920, entitled, "A Survey of Industrial Lighting in Fifteen States," R. O. Eastman submitted some very interesting data regarding the lighting conditions in industrial institutions. The survey comprises some 446 institutions, in which lighting was considered by 55.4% as being vitally important, and by 31.6% as being moderately important, and by 13% as being of little importance. Practically 58% considered that lighting was as important as power in the operation of the plant, and a small proportion would give more attention to lighting than to anything else.

In considering the present condition of lighting as found in the various plants, only 9% ranked as excellent, about $\frac{1}{3}$ ranked as good, 29% fair, 18.8% poor, 3.5% very poor, and 7.8% partly good and partly poor. It was found that the lighting in the offices was far superior to that in the shops; 19% being excellent, 36% good, 31% fair, and only 13% poor and none very poor.

On consulting the executives regarding what factors were most important in considering lighting, the following facts were revealed: Increase of production 79.4%, decrease of spoilage 71.1%, prevention of accidents 59.5%, improvement of good discipline 51.2%, and improvement of hygienic conditions 41.4%. Manufacturers who have good lighting appreciated its value largely from the standpoint of its stimulating effect upon output.

There is no question that any intelligent man who carefully considers the necessity for good lighting in an industrial plant, will agree that it is impossible for a person to do as good work, either in quality or quantity, in poor light as in good light, but yet the result of a careful analysis discloses the fact that only about 40% of industrial plants are furnishing good light to their workers and 60% are operating under poor lighting. It is hard to understand why such a proportion of concerns can be satisfied with a condition which is universally admitted to be a curtailer of efficiency and a prolific causer of accidents. The principal cause of this condition is that those in charge of such establishments have not given the attention to lighting that it demands. They do not know what constitutes good lighting, and in their absorbing interest of other factors of production have overlooked a vital one.

Every safety official should deeply interest himself in the lighting of his plant and insist upon good lighting as much as good goggles, good guards and other necessary accident prevention equipment. Every production manager should insist upon good lighting because the efficiency of the working force is increased by the condition of the lighting furnished. The plant physician should examine the lighting, for eye strain and eye fatigue are directly affected by poor lighting, as is the hygienic condition. Well lighted plants are invariably cleaner than poor lighted places. Plants equipped with Factrolite Glass in all windows are well lighted.

If you are interested in the distribution of light through Factrolite, we will send you a copy of Laboratory Report—"Factrolited."

MISSISSIPPI WIRE GLASS CO.,

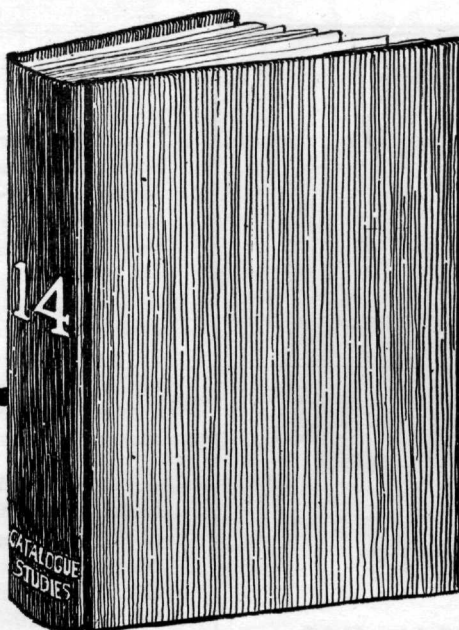
220 Fifth Avenue,

St. Louis.

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Chicago.

Ask your Librarian for Vol. 14 of *Catalogue Studies* to get complete information about the most economical and efficient use of explosives.



Vol. 14 of *Catalogue Studies* contains: "Eliminating Waste in Blasting", "Scientific Quarry Blasting", "The Scientific Selection of Explosives for Coal Mining", "Shot-firing by Electricity", "Land Clearing and Wood Utilization by Distillation", "Hercules Explosives and Blasting Supplies", "Flotation—A Brief Survey", "Hercules Galvanometers and Rheostats with Instructions for Their Use", "Dynamite—the New Aladdins Lamp", "Land Development."



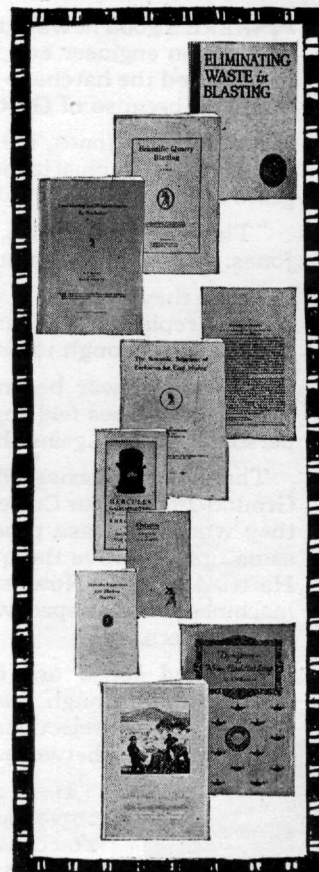
Catalogue Studies

KNOWLEDGE of the use of explosives is an essential part of the training of every engineer. This knowledge is at your disposal in Vol. 14 of *Catalogue Studies*—a series of books containing the technical literature of the leading manufacturers of the country. If you are not already familiar with it, ask your college librarian.

Vol. 14 contains ten authoritative text-books (as shown in the illustrations on this page), published by the Hercules Powder Co., which tell in detail, with illustrations and diagrams, how, when and where to use various explosives most economically and efficiently and explain the development of dynamite from its origin to the present day.

The booklet on *Flotation* is especially interesting to mining engineering students who wish to know about the concentration of ore by the use of flotation oils.

In the booklet entitled *Hercules Explosives and Blasting Supplies* you will find a complete list of Hercules publications to date, any of which will be sent you on request. Furthermore, if there is any special subject connected with blasting which is not fully covered in these books, The Hercules Powder Company Library will gladly furnish you with a bibliography on receipt of your letter addressed to 941 King Street, Wilmington, Delaware.



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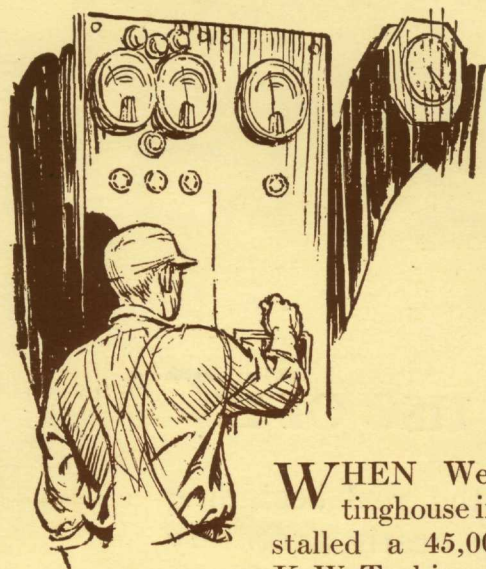


Louisville, Ky.
New York City
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Pittsburgh, Pa.
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San Francisco, Calif.
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Wilmington, Del.

A Record Still Unbroken



At 5:20 P. M., March 8th, 1920, Westinghouse Turbine Established World's Record for Continuous Running.

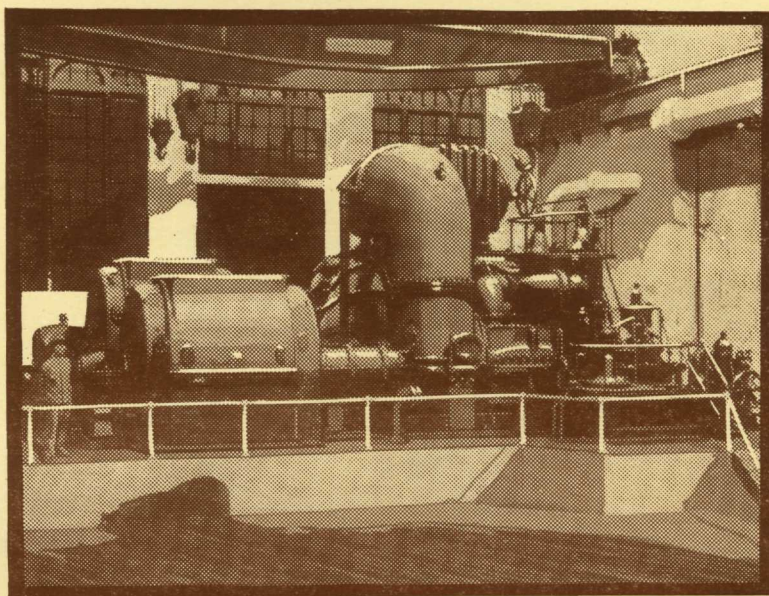
What Engineering Owes to Good Workmanship

WHEN Westinghouse installed a 45,000 K. W. Turbine in the power house of the Narragansett Electric Light Company, Providence, R. I., early in December, 1919, there was no thought of more than the average weekly power house run. Abnormal weather conditions, however, brought so steady a demand for power, that the unit was not shut down until March 8th, 1920, after a continuous run of 84 days, 11 hours, and 36 minutes.

This was especially remarkable in that the unit consists of two turbine generator sets, each of which operates independently of the other, so that the result was the mechanical equivalent of operating a single machine continuously for 169 days.

If space permitted, many astounding figures could be cited—about the K. W. H. generated during this period, the water and coal used, the cooling system, the oiling system, etc.

For example, to keep the generators cool, over 18,000,000,000 cubic feet of air passed through them, which equals 2,000 times the total weight of the generators and their bed plates.



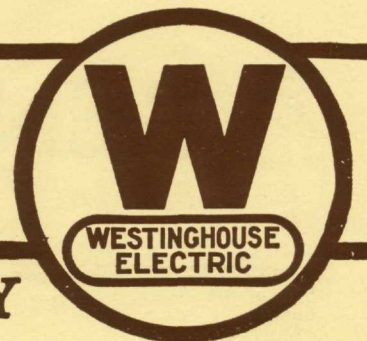
45,000 K. W. Westinghouse Cross-Compound Turbine Unit at the Station of the Narragansett Electric Light Company, Providence, R. I.

Equally impressive, oil was pumped through the self-contained lubricating system to the bearings at the rate of 600 gallons a minute. Had the oiling system failed for only 30 seconds, the bearings would have been wrecked, and other parts of the unit harmed!

There is interesting history back of the operation of Westinghouse Turbine Units of 3,000 K. W. and higher. Notable records have been made in many of the world's great power plants, performance that is a tribute to remarkable engineering and good workmanship.

Westinghouse

ACHIEVEMENT & OPPORTUNITY





MICHAEL FARADAY
1791-1867

Apprentice to an English book-binder. Attracted the attention of Sir Humphrey Davy, becoming his assistant. "The greatest experimentalist of all times," says one biographer. The electrical unit Farad was named for him.



In 1880 the Edison Electric Illuminating Company, of New York City, installed a generator of 1200 lamp capacity, then considered a giant. By continuous experimentation and research the General Electric Company has developed generators 900 times as powerful as this wonder of forty years ago.

"What's the use of it?"

Michael Faraday saw the real beginning of the age of electricity nearly a century ago when he thrust a bar magnet into a coil of wire connected with a galvanometer and made the needle swing.

Gladstone, watching Faraday at work in his laboratory, asked, "What's the use of it?" The experimenter jestingly replied, "There is every probability that you will soon be able to tax it." The world-wide use of electricity that has followed the Faraday discovery abundantly justifies the retort to Gladstone.

Faraday's theory of lines of force is constantly applied in the Research Laboratories of the General Electric Company in devising new electrical apparatus of which Faraday never dreamed. Every generator and motor is an elaboration of the simple instruments with which he first discovered and explained induction.

GENERAL ELECTRIC
